ABSTRACT OF THE DISCLOSURE

A position sensor using a novel structured light generating scale or target member is provided. An imaging array is capable of measuring the relative translation and orientation of the structured light generating scale or target member in X, Y, Z, yaw, pitch, and roll ("6D") simultaneously, and with high precision. The target member includes an array of lenses that provide an array of structured light patterns that diverge, converge, or both, to change the size of the corresponding structured light image as a function of the "Z" coordinate of the relative position, in various embodiments. The X-Y position of each individual structured light image on the imaging array varies with the relative X-Y position of the structured light generating target member, and the shape of structured light image changes as a function of the relative angular orientation. Accordingly, three or more structured light images analyzed in the same image are usable to determine a 6D measurement between the structured light generating target member and the array detector. X and Y displacement of the target member can be accumulated by known methods and the other 6D measurement components are absolute measurements at any position.

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